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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/696,436	10/24/2000	Ted J. Cooper	80398.P350	3904

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EXAMINER

YE, LIN

ART UNIT	PAPER NUMBER
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2615

DATE MAILED: 08/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/696,436

Applicant(s)

COOPER, TED J.

Examiner

Lin Ye

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to amended claims 1-20 filed on 6/7/04 have been considered but are moot in view of the new ground(s) of rejection.

Although a new ground of rejection has been used to address additional limitations that have been added to independent claims 1, 6, 11 and 16, a response is considered necessary for several of the applicant's arguments since the Lathrop reference will continue to be used to meet several of the claimed limitations in claims 16-20.

Relative to claim 16, the Applicant argues that the Lathrop reference discloses the edge enhancements operation during the demosiacing process for image is before being stored in the camera memory. The examiner disagrees. The Lathrop reference clearly disclose the **uninterpolated image data** (raw captured images) output from the sensor (CCD 16 includes a color filter array pattern) into the memory (20) (See Col. 3, lines 28-40); an microprocessor (22) reads out the uninterpolated image data from the memory (22); and performs certain preliminary processing of the uninterpolated image data, including color filter array interpolation (demosiacing process starting) and edge enhancement (See Col. 3, lines 45-55 and Col. 4, lines 5-9). The edge enhancements operation is **after** the raw image data stored in the camera memory.

Relative to claim 20, the unamended claim has been moved to the new ground rejection. Therefore, this official action is made in non-final.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hel-or et al. U.S. Patent 6,404,918 in view of Kimmel, IEEE Transactions on Image Processing, VOL. 8, No.9.

Referring to claim 1, the Hel-or reference discloses in Figures 1-3, an image processing method comprising: capturing an image (by image sensor, see Col. 3, lines 9-18); and providing edge enhancements (e.g., edge smoothing) to the captured image as part of a demosaicing process (See Col. 5, lines 56-63). However, the Hel-or reference does not explicitly shows an operation for increasing edge detail that also included in demosaicing process.

The Kimmel reference discloses an image processing method for demosaicing operation converts the raw image acquired with CCD sensor into a full colour image. This processing includes steps picture reconstruction and enhancement. In the step of reconstruction the missing points along the edges are interpolated, the edge now become curves rather than points (e.g., this can be considered as increase edge detail, see page 1222-1223, Figure 4). The Kimmel reference is evidence that one of

ordinary skill in the art at the time to see more advantages the demosaicing process including a operation to increase edge detail so that "Superresolution" beyond the sensors resolution can be achieved by the demosaicing process without limited due to the physical structure of sensors (See page 1221, Introduction section). For that reason, it would have been obvious to see the operation for increasing edge detail also included in demosaicing process disclosed by Hel-or.

Referring to claim 2, the Hel-or reference discloses performing post demosaicing processing on the captured image (See Figure 3, after step 39 to generate new RGB image can be considered as post demosaicing processing); and outputting the processed image (in steps 36-37).

Referring to claim 3, the Hel-or reference discloses wherein providing the edge enhancements includes: creating a brightness map (image is then separated into a luminance band Y, and two chrominance bands, I and Q as shown in step 32 in Figure 3) of the captured image.

Referring to claim 4, the Hel-or reference discloses wherein providing the edge enhancements further includes: detecting edges of the captured image using the brightness map (using the luminance band Y in step 32 in Figure 3); creating a mask image (new Y-image) from the edge detected brightness map (generate new Y-image from smoothed component images in step 35 in Figure 3); and performing unsharp edge enhancement (edge smoothing) from the masked image (See step 39 in Figure 3 and Col. 6, lines 53-60).

Referring to claim 5, the Hel-or reference discloses wherein providing the edge enhancements further includes: blending multiplicatively the unsharp edge enhanced

image with the brightness map (Y image); (e.g., blending the isotropic smoothing process in step 38 to step 39 can be considered as blending multiplicatively the unsharp edge enhanced image with the brightness map).

Referring to claim 6, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 1.

Referring to claim 7, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 2.

Referring to claim 8, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 3.

Referring to claim 9, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 4.

Referring to claim 10, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 5.

Referring to claim 11, (It should be noted that the preamble does not anticipate this claim) the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 1.

Referring to claim 12, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 2.

Referring to claim 13, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 3.

Referring to claim 14, the Hel-or and Kimmel references disclose all subject matter as discussed with respected to same comment as with claim 4.

Referring to claim 15, the Hel-or and Kimmel references disclose all subject matter as discussed with respect to same comment as with claim 5.

4. Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hel-or et al. U.S. Patent 6,404,918 in view of Kimmel, IEEE Transactions on Image Processing, VOL. 8, No.9 and Lathrop et al. U.S. Patent 6,288,743.

Referring to claim 16, the Hel-or and Kimmel references disclose all subject matter as discussed in respected claim 1, except the reference does not explicitly state a memory to store the captured image and a processor to provide edge enhancements to the captured image in the memory.

The Lathrop reference discloses in Figure 1, an image processing device comprising: a image sensor (CCD 16); a memory device (20) to store the captured image; and a processor (22) to provide edge enhancements to the captured image in the memory (Col 3, lines 30-42 and Col 4, lines 5-36). The Lathrop reference is evidence that one of ordinary skill in the art at the time to see more advantages the image processing device including a memory device to store the captured image for doing image processing (such as edge enhancements) late and avoiding to loss any image data during the processing. For that reason, it would have been obvious to the image-processing device having a memory to store the captured image and a processor to provide edge enhancements to the captured image in the memory disclosed by Hel-or.

Referring to claim 17, the Hel-or and Kimmel and Lathrop references disclose all subject matter as discussed in respected claim 16, and the Lathrop reference discloses

wherein the image capturing unit includes a charge-couple device (CCD) array (CCD 16, see Col. 3, lines 16-20) phototransistors, or photodiodes.

Referring to claim 18, the Hel-or and Kimmel and Lathrop references disclose all subject matter as discussed in respected claim 17, and the Lathrop reference discloses wherein the output unit is a display device (display monitor 12).

Referring to claim 19, the Hel-or and Kimmel and Lathrop references disclose all subject matter as discussed in respected claim 18, and the Hel-or and Lathrop references disclose all subject matter as discussed with respected to same comment as with claims 2 and 18.

Referring to claim 20, the Hel-or, Kimmel and Lathrop references disclose all subject matter as discussed in respected claim 16, and the Lathrop reference discloses an imaging apparatus (digital camera 10) has a demosaicing processing (interpolate the uninterpolated Bayer pattern digital image data); and a post demosaicing processing (white balance, see Col. 3, lines 50-55) for a white balancing processing. The Lathrop reference is evidence that one of ordinary skill in the art at the time to see more advantages the post demosaicing processing is a white balancing or other image processing so that the scene illumination can be estimate more accurately. For that reason, it would have been obvious to the post demosaicing processing is a white balancing processing or a chromatic improvement processing disclosed by Hel-or.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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- a. Motta U.S 6,650,795 discloses a digital image processor including a demosaicing processing and a post demosaicing processing is a white balance processing (See Col. 4, lines 28-32).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Lin Ye** whose telephone number is **(703) 305-3250**. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on (703) 308-9644.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, DC. 20231

Or faxed to:

(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal drive, Arlington, VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

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Lin Ye

August 23, 2004

A handwritten signature in black ink, consisting of a series of loops and a long horizontal stroke extending to the right.

ANDREW CHRISTENSEN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600